REMARKS

In the first Office action under the RCE, independent claims 1 and 10 were rejected under 35 U.S.C. 102(e) as being anticipated by U.S. patent no. 6,163,381, Davies et al. Dependent claims 7-9 were rejected under 35 U.S.C. 103(a) over Davies et al. for not adding any limitation of patentable substance to their parent claim 1. Dependent claims 2-6 and 11-15 were considered allowable if rewritten in independent form. Applicant respectfully traverses the rejection of claims 1 and 7-10 and offers the following remarks in support of this position.

Davies et al. use two wavefront sensors and corresponding reconstruction matrixes with merged outputs to correct a deformable mirror for scintillation effects on a wavefront. More specifically, Davies et al. use a Hartmann wavefront sensor coupled to a real reconstructor to provide a suitable estimation of the compensating wavefront. The Hartmann sensor provides slopes; the reconstructor reconstructs the wavefront from the slopes and translates the wavefront to commands to implement the wavefront on the deformable mirror when the atmosphere is not severe. However, this combination is ineffective for compensating a wavefront that is distorted by scintillation(see col. 3, line 66 to col. 4, line 5).

To compensate for scintillation effects, Davies et al. add a second wavefront sensor, known as a unit shear LSI wavefront sensor, that measures discontinuities in the incoming wavefront. These discontinuities appear as part of the incoming scintillated wavefront. A complex reconstructor processes the discontinuities to provide improved estimates of the wavefront tilts or slopes when turbulence is severe. When turbulence is not severe, a merge function passes the wavefront estimate from the real reconstructor to the deformable mirror. When turbulence is severe, the wavefront from the real constructor is used to provide only an integer number of waves correction estimate and merges this in the merge function with the wrapped phase wavefront estimate from the complex reconstructor to provide a total wavefront estimate to control the deformable mirror. (see col. 4, lines 5-20).

Independent claims 1 and 10 were amended to render their recitation more definite in particularly pointing out Applicant's invention. Support for the amendments to claims 1 and 10 is found in the specification on pages 9 and 10 and equations 1-3. The average amplitude referred to in the specification on pages 9 and 10 supports the claim recitation of an amplitude

reference level as shown in equations 1-3. Davies et al. does not anticipate amended independent claims 1 and 10 for the following reasons.

Amended claim 1 recites, in substance, that the amplitude information of the subapertures received from the wavefront sensor is processed to produce an amplitude reference level, that each subaperture slope is weighted with a weighting function based on the corresponding subaperture amplitude and the amplitude reference level to produce weighted subaperture slopes, and that a matrix multiplier receives the weighted subaperture slopes and generates control signals that control the actuators based on the weighted slopes. Amended claim 10 is a method counterpart of amended claim 1. Davies et al. does not teach or suggest the aforementioned aspects of claims 1 and 10.

Rather, Davies et al. teach two wavefront sensors neither of which may be used independently of the other for minimizing the effects of scintillation. The output of the Hartmann sensor is operated on by a real reconstructor and the output of the unit shear LSI wavefront sensor is operated on by a complex reconstructor and the outputs of the two reconstructors are merged together to provide the control to the actuators of the deformable mirror. Davies et al. do not teach processing the amplitudes of either wavefront sensor to produce an amplitude reference level, or weighting each subaperture slope (tilt) of either wavefront sensor with a weighting function based on the corresponding subaperture amplitude and amplitude reference level to produce weighted subaperture slopes, or receiving the weighted subaperture slopes by either of the real or complex reconstructors for generating signals to control that actuators based on the weighted subaperture slopes.

The examiner is correct in his assertion that the MCR produces a real component corresponding to subaperture intensity and an imaginary component to slope (tilt) which are used to control the actuators of the deformable mirror to compensate for scintillation effects. But, the way Davies et al. achieves the end result is completely different than that claimed by Applicant. For example, if Davies et al. inserted Applicant's slope weighted function between the Hartmann sensor and real reconstructor, the resultant embodiment would be similar to that taught by Applicant. However, Davies et al. offer no teaching or suggestion of such an embodiment. Rather, Davies et al. chose to add another sensor and complex reconstructor to produce complex signals that are merged with the signals of the real reconstructor to obtain the eventual control

signals. This overall embodiment taught by Davies et al. is rather complex, complicated, time consuming in its calculations and not well suited for a high bandwidth control loop needed to control the deformable mirror for estimated wavefront distortions. In contrast, Applicant's embodiment is simpler and provides for a high bandwidth loop control.

For at least the above given reasons, amended independent claims 1 and 10 are considered novel and unobvious over Davies et al. The rejected dependent claims 7-9 include all of the limitations of their parent claim 1 and thus, are also considered patentably distinguishable over Davies et al. for at least the same reasons given for their parent claim 1.

Applicant acknowledges the allowability of dependent claims 2-6 and 11-15, but consider all of the amended and remaining claims 1-15 allowable. Therefore, Applicant has taken no action in the instant response as regards allowable claims 2-6 and 11-15.

The prior art not cited against the Applicant's claims, but considered pertinent to Applicant's disclosure, have been reviewed and considered not to materially affect the patentability of the amended and remaining claims 1-15 of the instant application.

It is further acknowledged that the reference to Davies et al. is being cited against the claims 1 and 7-10 as a reference under 35 U.S.C. 102(e). While Applicant has not challenged the effectiveness of the Davies et al. reference in the instant response, it is understood that such lack of challenge should not be considered as a waiver of any of Applicant's rights in this regard. Accordingly, Applicant reserves the right to swear behind the Davies et al. reference should it become necessary in the future prosecution of the instant application.

In view of the above, the instant application is considered in condition for allowance, and therefore, an early issuance thereof is earnestly solicited.

Respectfully submitted,

William E. Zitelli

William E. Zitelli
Attorney for Applicants
Reg. No. 28,551

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